



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Lawrence W. Hrubesh Attorney Docket: IL-10413
Serial No. : 10/050,437 Art Unit: 1754
Filed : July 20, 2004 Examiner: P. Lish
For : Lightweight, High Strength Carbon
Aerogel Composites And Method Of Fabrication

DECLARATION UNDER 37 CFR §1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Lawrence W. Hrubesh, hereby declare that I am a citizen of the United States of America and a resident of Pleasanton, California.

I have a PhD in Molecular Physics from the University of Wyoming.

I am a Physicist with the University of California, Lawrence Livermore National Laboratory at Livermore, California.

I have worked at Lawrence Livermore National Laboratory as a Physicist for 36 years. I have worked in the aerogel/sol-gel field at Lawrence Livermore National Laboratory for 20 years.

I have read the office action and would like the examiner to consider my comments in response to the rejections of claims 1, 4, 8 and 18.

Claims 1 and 18 are rejected as being anticipated by Droege. Claims 1, 4, 8 and 18 are rejected as being unpatentable over Pekala et al. in view of Kaschmitter. I respectfully disagree with these rejections.

Table 1 of my application shows examples of the thermal conductivities of several types of carbon composites of aerogel loaded foam that were produced according to the method recited in claim 1. As confirmed in the attached reference: J. Appl. Phys. 73 (2) 1993, incorporated herein by reference, these thermal conductivities are very near to that of monolithic aerogels of comparable densities, which have average pore sizes that are less than 100 nm. This reference shows that low thermal conductivities in monolithic aerogels are the consequence of their unique morphology, consisting of particles and pores, which are smaller than the wavelengths of visible light. Moreover, this reference shows that such low conductivities would not be obtained if an aerogel was not truly monolithic (for example, if cracks, gaps, or large pores enabled paths for thermal energy to flow) and thus, if it did not have an average pore size less than 100 nm. It follows then that the monolithic glassy carbon composites of the present invention have average pore sizes that are less than 100 nm.

Monolithic aerogels are dried with special procedures, such as supercritical drying, that reduce surface tensile forces and minimize shrinkage, to produce these small pores. The present invention uses such drying procedures. It is well known in the art that using a supercritical drying step will produce an aerogel that has relatively small average pore size. See the attached reference: J. Non-Cryst. Solids 186 (1995), incorporated herein by reference. This reference shows that typical pore sizes for supercritically dried aerogels are less than 10 nm, even when different pore solvents are used (i.e., alcohols or carbon dioxide).

Claim 1 of my patent application includes a drying step that reduces surface tensile forces so that the organic aerogel and the preformed polymer foam/fiber-mat that it encapsulates, are essentially monolithic. After pyrolysis, they remain essentially in contact at their interfaces to form a monolithic glassy carbon material.

The Droege reference teaches a drying method that does not reduce surface tensile forces adequately to produce a monolithic composite, nor to form an essentially monolithic composite when pyrolyzed. The reference does not teach how to produce an essentially monolithic foam/mat aerogel composite. Therefore the rejection should be removed.

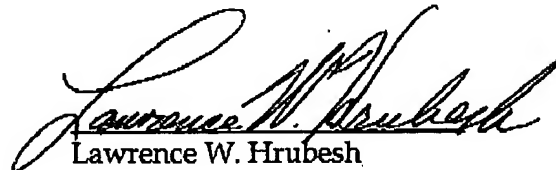
In both Pekala and Kaschmitter, the pore size is required to be large enough so that fluid (electrolyte) can flow. Thus, neither reference teaches a method for producing a monolithic foam/mat aerogel composite. The composites produced by the Pekala and Kaschmitter patents do not exhibit the same bulk properties as a monolithic aerogel because the average pore size is relatively large. In fact, such large pores, which enable easy fluid transport through the material, are essential for the application of energy storage. Therefore the rejection should be removed.

Accordingly, I respectfully request that the rejections be withdrawn.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or

both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Respectfully submitted,


Lawrence W. Hrubesh

Dated: January 19, 2005